IN THE CLAIMS:

Please cancel without prejudice claims:

25 through 32, and

39, 40 and 60; and

also revise without prejudice claims:

1, 2, 3, 6, 9,

11 through 15,

18, 19, 21, 23, 24,

33 through 35,

37, 38, 41, 42, 45, 46,

48 through 51,

54 through 62, and

65; and

also add new claims 67 through 78,

all as indicated below.

1. (currently amended) Apparatus for deterring failure of a computing system; said apparatus comprising:

a hardware network of components, having substantially no software and substantially no firmware except programs held in an unalterable read-only memory;

terminals of the network for connection to such system; and

fabrication-preprogrammed hardware circuits of the network for guarding such system from failure.

2. (currently amended) The apparatus of claim 1, particularly for use with such system that is substantially exclusively made up of ~~substantially~~ commercial, off-the-shelf components; and wherein:

at least one of the network terminals is connected to receive at least one error signal generated by such system in event of incipient failure of such system; [[and]]

at least one of the network terminals is connected to provide at least one recovery signal to such system upon receipt of the error signal; and

the apparatus further comprises means for automatically responding to the at least one error signal by generating the at least one recovery signal for guarding all of such system against failure.

3. (currently amended) The apparatus of claim 1 [[2]], wherein:

the network is an infrastructure which is generic in that it can accommodate any such system that can issue an error message and handle a recovery command

~~the circuits comprise portions fabrication-preprogrammed to evaluate the at least one error signal to establish characteristics of the at least one recovery signal~~.

4. (original) The apparatus of claim 1, further comprising:

such computing system.

5. (original) The apparatus of claim 1, wherein:

the circuits comprise portions for identifying failure of any of the circuits and correcting for the identified failure.

6. (currently amended) The apparatus of claim 1, ~~particularly for use with a computing system that has at least one software subsystem for conferring resistance to failure of the system, and~~ wherein:

the circuits are not capable of running any application program

~~the circuits comprise substantially no portion that interferes with such failure-resistance software subsystem~~.

7. (original) The apparatus of claim 1, particularly for use with a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one hardware subsystem for generating a response of the system to failure; and wherein:

the circuits comprise portions for reacting to said response of such hardware subsystem.

8. (original) The apparatus of claim 1, particularly for use with a computing system that has plural generally parallel computing channels; and wherein:

the circuits comprise portions for comparing computational results from such parallel channels.

9. (currently amended) The apparatus of claim 8, wherein:

the parallel channels of <u>such</u> [[the]] computing system are of diverse design or origin.

10. (original) The apparatus of claim 1, particularly for use with a computing system that has plural processors; and wherein:

the circuits comprise portions for identifying failure of any of such processors and correcting for identified failure.

11. (currently amended) The apparatus of claim 1, wherein:

the circuits comprise modules for collecting and responding [[t]] to data received from at least one of the terminals, said modules comprising:

at least three data-collecting and -responding modules, and

processing sections for conferring among the modules to determine whether any of the modules has failed.

12. (currently amended) The apparatus of claim 1, particularly for use with a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one subsystem for generating a response of the system to failure, and that also has at least one subsystem for receiving recovery commands; and wherein:

the circuits comprise portions for interposing analysis and a corrective reaction between the response-generating subsystem and the command-receiving subsystem.

13. (currently amended) Apparatus for deterring failure of an entire computing system, wherein the computing system optionally includes plural mutually redundant modules; said apparatus comprising:

a network of components having terminals for connection to such system, wherein the network is constructed to be initially and permanently distinct from such computing system including all of such redundant modules if present; and

circuits of the network for operating programs to guard such entire system from failure;

the circuits comprising portions for identifying failure of any of the circuits and correcting for the identified failure.

14. (currently amended) The apparatus of claim 13, wherein:

the program-operating portions comprise a section that corrects for the identified failure by automatically taking a failed circuit out of operation.

15. (currently amended) The apparatus of claim 13 [[14]], wherein:

the network is an infrastructure that continuously waits to respond to messages from such system

~~the program-operating portions comprise a section that substitutes and powers up a spare circuit for a circuit taken out of operation~~.

16. (original) The apparatus of claim 13, further comprising:

such computing system.

17. (original) The apparatus of claim 13, wherein:

the program-operating portions comprise at least three of the circuits; and

failure is identified at least in part by majority vote among the at least three circuits.

18. (currently amended) The apparatus of claim 13, wherein:

said circuits receive from such system error messages warning of incipient failure, and issue recovery commands to such system

~~particularly for use with a computing system that has at least one software subsystem for conferring resistance to failure of the system; and wherein: the circuits comprise substantially no portion that interferes with such failure-resistance software subsystem~~.

19. (currently amended) The apparatus of claim 13, particularly for use with a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one hardware subsystem for generating a response of the system to failure; and wherein:

the circuits comprise portions for reacting to said response of such hardware subsystem.

20. (original) The apparatus of claim 13, particularly for use with a computing system that has plural generally parallel computing channels; and wherein:

the circuits comprise portions for comparing computational results from such parallel channels.

21. (currently amended) The apparatus of claim 16 [[20]], wherein:

the computing system has [[the]] parallel channels that ~~of the computing system~~ are of diverse design or origin.

[FOR THE EXAMINER'S CONVENIENCE: PLEASE SEE NEW CLAIM 70, PREFERABLY FOR INSERTION HERE.]

22. (original) The apparatus of claim 13, particularly for use with a computing system that has plural processors; and wherein:

the circuits comprise portions for identifying failure of any of such processors and correcting for identified failure.

23. (currently amended) The apparatus of claim 13, wherein:

the network is an infrastructure which is generic in that it can accommodate any such system that can issue an error message and handle a recovery command

~~the circuits comprise modules for collecting and responding to data received from at least one of the terminals, said modules comprising:~~

~~at least three data-collecting and -responding modules, and~~

~~processing sections for conferring among the modules to determine whether any of the modules has failed~~.

24. (currently amended) The apparatus of claim 13, particularly for use with a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one subsystem for generating a response of the system to failure, and that also has at least one subsystem for receiving recovery commands; and wherein:

the circuits comprise portions for interposing analysis and a corrective reaction between such [[the]] response-generating subsystem and such [[the]] command-receiving subsystem.

25. - 32. (canceled)

33. (currently amended) Apparatus for deterring failure of a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one hardware subsystem for generating an error message ~~response~~ of the system about incipient [[to]] failure; said apparatus comprising:

a network of components having terminals for connection to such system; and

circuits of the network for operating programs to guard such system from failure;

the circuits comprising portions for reacting to such [[said]] error message ~~response~~ of such hardware subsystem.

34. (currently amended) The apparatus of claim 33, wherein:

the circuits guard the entire such system from failure

~~the reacting portions comprise sections for evaluating the hardware-subsystem response to establish characteristics of at least one recovery signal~~.

35. (currently amended) The apparatus of claim 33 [[34]], wherein:

the network is generic in that it can accommodate any such system that can issue an error message and handle a recovery command

~~the reacting portions comprise sections for applying the at least one recovery signal to such system~~.

36. (original) The apparatus of claim 33, further comprising:
such computing system, including such hardware subsystem.

37. (currently amended) The apparatus of claim 36 [[33]], wherein:
the ~~particularly for use with a~~ computing system ~~that~~ has plural generally parallel computing channels; and
the parallel channels of the computing system are of diverse design or origin
~~wherein: the circuits comprise portions for comparing computational results from such parallel channels~~.

38. (currently amended) The apparatus of claim 33, wherein:
said circuits are not capable of operating any application program
~~the parallel channels of the computing system are of diverse design or origin~~.

39. and 40. (canceled)

41. (currently amended) The apparatus of claim 33, particularly for use with a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one subsystem for generating a response of the system to failure, and that also has at least one subsystem for receiving recovery commands; and wherein:

the circuits comprise portions for interposing analysis and a corrective reaction between such [[the]] response-generating subsystem and such [[the]] command-receiving subsystem.

42. (currently amended) Apparatus for deterring failure of an entire computing system that is distinct from the apparatus and that has plural generally parallel computing channels and has at least one application-data input module, and at least one processor for running an application program; said apparatus comprising:

a network of components having terminals for connection to such system; and

circuits of the network for operating programs to guard such entire system from failure, wherein the ~~such~~ network is constructed to be initially and permanently distinct from such computing system including substantially (a) every such application-data input module and (b) every such application-program processor, and (c) all of such parallel computing channels;

the circuits comprising portions for comparing computational results from such parallel channels.

43. (original) The apparatus of claim 47 [[42]], wherein:

the parallel channels of the [[such]] computing system are of diverse design or origin.

44. (original) The apparatus of claim 42, wherein:

the comparing portions comprise at least one section for analyzing discrepancies between the results from such parallel channels.

45. (currently amended) The apparatus of claim 44, wherein:

the circuits are not capable of running any application program

~~the comparing portions further comprise at least one section for imposing corrective action on such system in view of the analyzed discrepancies~~.

46. (currently amended) The apparatus of claim 42, [[45]], wherein:

the network is an infrastructure which is generic in that it can accommodate any such system that can issue an error message and computational results, and handle a recovery command

~~the at least one discrepancy-analyzing section uses a majority voting criterion for resolving discrepancies~~.

47. (original) The apparatus of claim 42, further comprising:

such computing system.

48. (currently amended) The apparatus of claim 42 [[47]], wherein:

the circuits do not and cannot operate any application program

~~the parallel channels of the computing system are of diverse design or origin~~.

49. (currently amended) The apparatus of claim 48, wherein:

the circuits receive from such computing system error messages warning of incipient failure and issue recovery commands to such computing system

~~the comparing portions comprise circuitry for performing an algorithm to validate a match that is inexact~~.

50. (currently amended) [[The a]] Apparatus ~~of claim 49~~ for deterring failure of a computing system that is distinct from the apparatus and that has plural generally parallel computing channels; said apparatus comprising:

a network of components having terminals for connection to such system; and

circuits of the network for operating programs to guard such system from failure, wherein such network is constructed to be initially and permanently distinct from such computing system including all of such parallel computing channels;

the circuits comprising portions for comparing computational results from such parallel channels; and wherein:

the comparing portions comprise circuitry for performing an algorithm to validate a match that is inexact; and

the algorithm-performing circuitry employs a degree of inexactness suited to a type of computation under comparison.

51. (currently amended) The apparatus of claim 50 [[49]], wherein:

the algorithm-performing circuitry performs an algorithm that selects a degree of inexactness based on type of computation under comparison.

[FOR THE EXAMINER'S CONVENIENCE: PLEASE SEE NEW CLAIM 71 THROUGH 74, PREFERABLY FOR INSERTION HERE.]

52. (original) The apparatus of claim 42, particularly for use with a computing system that has plural processors; and wherein:

the circuits comprise portions for identifying failure of any of such processors and correcting for identified failure.

53. (original) The apparatus of claim 42, wherein:

the circuits comprise modules for collecting and responding to data received from at least one of the terminals, said modules comprising:

at least three data-collecting and -responding modules, and

processing sections for conferring among the modules to determine whether any of the modules has failed.

54. (currently amended) The apparatus of claim 42, particularly for use with a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one subsystem for generating a response of the system to failure, and that also has at least one subsystem for receiving recovery commands; and wherein:

the circuits comprise portions for interposing analysis and a corrective reaction between such [[the]] response-generating subsystem and such [[the]] command-receiving subsystem.

55. (currently amended) Apparatus for deterring failure of any computing system that has plural processors and has at least one application-data input module, and at least one processor for running an application program, and is capable of generating an error message warning of incipient failure and capable of responding to a recovery command; said apparatus comprising:

a network of components having terminals for connection to such system, wherein the network is constructed to be initially and permanently distinct from such any computing system including substantially (a) every such application-data input module and (b) every such application-program processor, and (c) all of such plural processors; and

circuits of the network for operating programs to guard any such system from failure;

the circuits comprising portions for identifying failure of any of such processors and correcting for identified failure.

[FOR THE EXAMINER'S CONVENIENCE: PLEASE SEE NEW CLAIM 75, PREFERABLY FOR INSERTION HERE.]

56. (currently amended) The apparatus of claim 75 [[55]], wherein:

the identifying portions comprise a section that corrects for the identified failure by taking a failed processor out of operation.

57. (currently amended) The apparatus of claim 75 [[55]], wherein:

the circuits cannot and do not run an application program

~~the section comprises parts for taking a processor out of operation only in case of signals indicating that the processor has failed permanently~~.

58. (currently amended) The apparatus of claim 75 [[55]], wherein:

the circuits protect the entire such computing system

~~the identifying portions comprise a section that substitutes and powers up a spare circuit for a processor taken out of operation~~.

59. (currently amended) The apparatus of claim 75 [[55]], further comprising:

such computing system.

60. (canceled)

61. (currently amended) The apparatus of claim 75 [[55]], particularly for use with a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one subsystem for generating a response of the system to failure, and that also has at least one subsystem for receiving recovery commands; and wherein:

the circuits comprise portions for interposing analysis and a corrective reaction between such [[the]] response-generating subsystem and such [[the]] command-receiving subsystem.

62. (currently amended) Apparatus for deterring failure of an entire computing system that is distinct from the apparatus and has at least one application-data input module, and at least one processor for running an application program; said apparatus comprising:

a network of components having terminals for connection to such system; and

circuits of the network for operating programs to guard such entire system from failure;

the circuits comprising modules for collecting and responding to data received from at least one of the terminals, said modules comprising:

at least three data-collecting and -responding modules, and

processing sections for conferring among the modules to determine whether any of the modules has failed;

wherein the network, including all of the modules and substantially (a) every such application-data input module and (b) every such application-program processor, and (c) all of the processing sections, is constructed to be initially and permanently distinct from such computing system.

63. (original) The apparatus of claim 62, further comprising:

such computing system.

64. (original) The apparatus of claim 62, particularly for use with a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one subsystem for generating a response of the system to failure, and that also has at least one subsystem for receiving recovery commands; and wherein:

the circuits comprise portions for interposing analysis and a corrective reaction between <u>such</u> [[the]] response-generating subsystem and <u>such</u> [[the]] command-receiving subsystem.

[FOR THE EXAMINER'S CONVENIENCE: PLEASE SEE NEW CLAIMS 76 THROUGH 78, PREFERABLY FOR INSERTION HERE.]

65. (currently amended) Apparatus for deterring failure of a computing system that is substantially exclusively made of ~~substantially~~ commercial, off-the-shelf components and that has at least one subsystem for generating a response of the system to failure, and that also has at least one subsystem for receiving recovery commands; said apparatus comprising:

a network of components having terminals for connection to such system between the response-generating subsystem and the recovery-command-receiving subsystem; and

circuits of the network for operating programs to guard such system from failure;

the circuits comprising portions for interposing analysis and a corrective reaction between the response-generating subsystem and the command-receiving subsystem.

66. (previously presented) The apparatus of claim 65, further comprising:

such computing system.

67. (new) The apparatus of claim 65, wherein:

the circuits cannot and do not run any application program.

68. (new) The apparatus of claim 65, wherein:

the circuits protect the entire such system.

69. (new) The apparatus of claim 65, wherein:

the network is an infrastructure which is generic in that it can accommodate any such system that can issue an error message and handle a recovery command.

70. (new) The apparatus of claim 13, wherein:

the circuits do not and cannot operate any application program.

71. (new) The apparatus of claim 50, wherein:

the circuits cannot and do not run any application program.

72. (new) The apparatus of claim 50, wherein:

the circuits protect the entire such system.

73. (new) The apparatus of claim 50, wherein:

the circuits receive from such computing system error messages warning of incipient failure and issue recovery commands to such computing system.

74. (new) The apparatus of claim 50, wherein:

the network is an infrastructure which is generic in that it can accommodate any such system that can issue an error message and computational results, and can handle a recovery command.

75. (new) The apparatus of claim 55, wherein:

the program-operating circuits guard any such system from failure by issuing a recovery command; and

the failure-identifying and correcting portions provide the recovery command.

76. (new) The apparatus of claim 62, wherein:

the circuits cannot and do not run any application program.

77. (new) The apparatus of claim 62, wherein:

the circuits protect the entire such system.